AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions of claims in the application.

LISTING OF THE CLAIMS:

Claim 1 (Currently Amended): A laser frequency stabilization device comprising:

a cell into which gas is charged,

an ECDL,

a laser frequency adjusting means for adjusting the frequency of laser a beam emitted from said ECDL,

a laser beam dividing means for dividing the laser beam from said ECDL into a pump beam and a probe beam,

an ON/OFF means for cutting off the pumping beam at a constant time interval,

a photo detector for measuring intensity of the probe beam after the probe beam is passed through said cell continuously and said pumping beam is passed through at intervals,

a computing means for obtaining the intensity of the probe beam detected by said photo detector, a demodulated signal of the probe beam, a difference in intensity of the probe beam between a case in which the pumping beam is ON and OFF, and a difference in demodulated signal, ~~and~~

a feedback means for feeding back information concerning the difference in the demodulated signal obtained by said computing means, to said laser frequency adjusting means which thereby stabilizes the frequency of said ECDL based on said information,

a first optical setup for introducing the probe beam into a flat surface of said cell, and a second optical setup for introducing the pumping beam into a side surface of said cell.

Claim 2 (Original): A laser frequency stabilization device according to claim 1, wherein said cell is square pole or cylindrical in shape.

Claim 3 (Original): A laser frequency stabilization device according to claim 1, wherein a length of said cell is 3mm to 7mm.

Claim 4 (Original): A laser frequency stabilization device according to claim 1, wherein said cell is cylindrical in shape and a length of said cell is 5mm.

Claim 5 (Original): A laser frequency stabilization device according to claim 1, wherein the gas charged into said cell is cesium atom.

Claim 6 (Original): A laser frequency stabilization device according to claim 1, wherein the gas charged into said cell is cesium atom, said ECDL is adjusted such that its frequency is tuned to a D_2 line of the cesium atom.

Claim 7 (Original): A laser frequency stabilization device according to claim 1, wherein the number of said ECDL is one, and a wavelength of laser beam showing the maximum intensity is 850nm to 854nm.

Claim 8 (Original): A laser frequency stabilization device according to claim 1, wherein said laser frequency adjusting means includes injection current control means which controls current injected into said ECDL and/or voltage control means which controls voltage to be applied to said ECDL.

Claim 9 (Original): A laser frequency stabilization device according to claim 1, wherein said ON/OFF means is an optical chopper that rotates at a predetermined velocity.

Claim 10 (Currently Amended): A laser frequency stabilization device according to claim 1, ~~further comprising~~

~~a first optical setup for introducing the probe beam into a flat surface of said cell, and~~

~~a second optical setup for introducing the pumping beam into a side surface of said cell,~~

wherein

said second optical setup has optical means for increasing a beam diameter of the pumping beam.

Claim 11 (Currently Amended): A laser beam frequency stabilization method using the sub-Doppler spectrum of atoms, comprising

a beam dividing process which divides a laser beam from an ECDL to obtain a pumping beam and a probe beam,

a beam introducing process for introducing the pumping beam and the probe beam divided by the beam dividing process into a cell in which gas is charged,

an ON/OFF means for causing irradiation/no irradiation of the pumping beam to the cell at a constant time interval,

a first demodulated signal obtaining process which modulates the frequency of the laser beam by laser frequency adjusting means for lock-in detection to obtain a demodulated signal of the probe beam,

a second demodulated signal obtaining process in which lock-in detection which is in synchronization with said constant time interval is carried out to obtain a demodulated signal of the probe beam, ~~and~~

a feedback process for feeding back, to the laser frequency adjusting means, an error signal obtained from the demodulated signal of the probe beam obtained in the second demodulated signal obtaining process,

a first optical setup process for introducing the probe beam into a flat surface of said cell, and a second optical setup process for introducing the pumping beam into a side surface of said cell.